BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

REMARKS

Claims 1–5 and 7–12 were pending at the time of the final Office Action. Entry of the amendments set forth above to claims 1, 2, 7 and 8 and entry of additional claims 14–18 is respectfully requested. The amendments and additional claims are supported by the specification and add no new subject matter.

Claims 1 and 3–5 stand rejected under 35 U.S.C. Section 102(e) as being anticipated by U.S. Patent No. 6,329,084 B1, issued to Tamano et al. However, the Tamano et al. patent does not teach a group with steric hindrance that is a substituted or non-substituted alkyl group having not less than four carbon atoms, as recited in independent claims 1 and 7. Therefore, the rejection under Section 102(e) is inappropriate and should be withdrawn.

Claims 1–5 and 7–12 stand rejected under 35 U.S.C. Section 103(a) as being unpatentable over JP 11-185961. However, JP 11-185961 is silent on the effect of the addition of a group with steric hindrance to perylene compounds having a diarylamino group. JP 11-185961 is also silent on adding a steric hindrance group to benzoperylene to in order to suppress aggregation of molecules.

In contrast, the EL device of the present invention, as recited in claims 1 and 7, provides an excellent brightness that is superior to the brightness of a device having only diarylamino and lacking a group with steric hindrance.

Comparative Example 1 provides experimental evidence of the superior performance of a perylene compound of the present invention over the performance of a structurally similar prior art compound that lacks an adamantyloxy group, as recited in claim 1. The inventive compound depicted in Fig. 3 was utilized as the light emitting layer in an organic EL device described in example 11. Comparative Example 1 employs 3, 9 bis (di-p-tolylamino) perylene, which is

structurally similar to the compound depicted in Fig. 3, except that it lacks an adamantyloxy group as recited in claim 1. A direct current voltage of 10 volts was applied to each of the organic EL devices and the brightness of the light emitted by each device was measured and recorded. The inventive compound depicted in Fig. 3 produced a brightness of 2980 cd/m^2, as compared to a brightness of 1600 cd/m^2 for the prior art material lacking an adamantyloxy group. Therefore, the inventive compound depicted in Fig. 3 provided a brightness 44% greater than that provided by the prior art device lacking an adamantyloxy group, as recited in claim 1.

Comparative Example 2 presents experimental evidence of the superiority of a perylene compound of the invention, which is depicted in Fig. 4, over a prior art compound that is structurally similar but lacks an adamantyloxy group, as recited in claim 1. When the compounds were included in comparable EL devices and stimulated with a direct current voltage of 10 volts, the inventive compound depicted in Fig. 4 emitted light having a brightness of 3010 cd/m^2, as compared to a light having a brightness of only 2000 cd/m^2 for the prior art compound lacking an adamantyloxy group, as recited in claim 1.

Comparative Examples 1 and 2 demonstrate unexpected and significantly superior results for perylene compounds including adamantyloxy as a steric hindrance group, as recited in claim 1. Therefore, the rejection of claim 1 is inappropriate.

In Comparative Examples 3 and 4, compounds of the invention are compared with compounds representative of those disclosed in JP 11-185961. For instance, Example 59 demonstrates the performance of a benzoperylene compound of the invention, which has the chemical structure depicted in Fig. 32. Comparative Example 3 demonstrates the performance at identical conditions of a prior art compound that is structurally similar, except that it lacks an adamantyl group as recited in claim 7 of the present specification. When a direct current voltage

of 10 volts was applied to an organic EL device that included the inventive compound depicted in Fig. 32, light was emitted with a brightness of 2300 cd/m^2. In contrast, the light emitted by a substantially similar EL device that included the prior art compound (i.e., without the adamantyl group for steric hindrance) exhibited a brightness of only 1800 cd/m^2. The brightness of inventive compound 32 was, therefore, 30% greater than that of the structurally similar prior art compound without an adamantyl group, as recited in claim 7.

Comparative Example 4 compares the performance of a compound of the invention, which is described in Example 60 and depicted in Fig. 33, with a structurally similar benzoperylene compound of the prior art, except that the prior art compound lacks an adamantyl group, as recited in claim 7. Under controlled conditions, the inventive compound depicted in Fig. 33 produces light having a brightness of 2980 cd/m^2. Under those same conditions, the prior art compound without the adamantyl group exhibited a brightness of only 2000 cd/m^2. Therefore, the inventive compound depicted in Fig. 33 of the specification provided a brightness that was 50% greater than that of the prior art compound lacking an adamantyl group, as recited in claim 7.

The experimental results of Comparative Examples 1–4, together with the results reported in Examples 11–12 and 59–60, respectively, demonstrate that EL devices of the present invention provide an unexpected and significantly superior result as compared to the EL devices described in JP 11-185961. Therefore, the rejection of claim 7 is inappropriate and should be withdrawn.

The arguments set forth above with regard to claim 1 apply equally well to dependent claims 2–5. The arguments set forth above with respect to claim 7 apply equally well to claims 8–15. Therefore, the rejection of claims 1–5 and 7–15 over JP 11-185961 should be withdrawn.

Claims 1–3 and 7–10 stand rejected under 35 U.S.C. §103(a) as being unpatentable over JP 10-88120. The use of an organic electroluminescent element composed in a compound in accordance with a general chemical formula is described in JP 10-88120. The formula of JP 10-88120 covers a broad range of compounds. However, JP 10-88120 does not teach any specific substituent groups that have the effect of suppressing aggregation of molecules.

Regarding claims 1–3 of the present specification, JP 10-88120 does not suggest the above-described surprising results demonstrated in Comparative Examples 1–2. Therefore, the rejection of claims 1–3 over JP 10-88120 is inappropriate.

Regarding claims 7–10 of the present specification, JP 10-88120 does not suggest the above-described surprising results demonstrated in Comparative Examples 3–4. Therefore, the rejection of claims 1–3 and 7–10 over JP 10-88120 is inappropriate and should be withdrawn.

Claims 1–5 and 7–12 stand rejected under the judicially-created doctrine of obviousness/double patenting as being unpatentable over claims 1–17 of U.S. Patent No. 6,329,083 B1. However, for the reasons set forth above with respect to JP 11-185961, the '083 does not suggest the surprising results demonstrated in Comparative Examples 1–4, 11–12 and 59–60 of the present specification. Therefore, the rejection of the judicially-created doctrine of obviousness/double patenting is inappropriate and should be withdrawn.

It is submitted that the present specification including all pending claims is in condition for allowance. Allowance and prompt passage to issue is respectfully requested. In the alternative, reconsideration and continuing examination are respectfully requested.

Respectfully submitted,

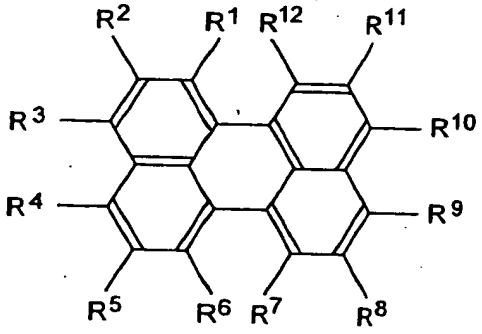
Dated: MAY 1, 2003

Perry J. Hoffman, Reg. No. 37,150
Robert A. Yesukevich, Reg. No. 36,064
Michael Best & Friedrich LLC
401 N. Michigan Avenue, Suite 1900
Chicago, IL 60611
(312) 222-0800
fax: (312) 222-0818

Attorneys for Applicant

Amendments with Markings to Show Changes

1. (Twice Amended) An organic electroluminescent (EL) device comprising an anode, a cathode, and one or more organic thin-film layers including a light-emitting layer sandwiched between the anode and the cathode, at least one of the organic thin-film layers including a perylene compound represented by a general formula [1] as follows:



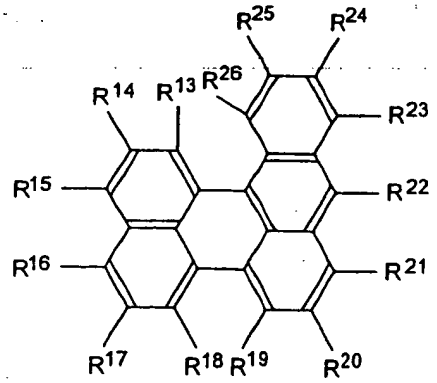
wherein each of R^1 to R^{12} independently represents a hydrogen atom, a halogen atom, hydroxy group, substituted or non-substituted amino group, nitro group, cyano group, substituted or non-substituted alkyl group, substituted or non-substituted alkenyl group, substituted or non-substituted styryl group, substituted or non-substituted cycloalkyl group, substituted or non-substituted alkoxy group, substituted or non-substituted aromatic hydrocarbon group, substituted or non-substituted aromatic heterocyclic group, substituted or non-substituted aralkyl group or substituted or non-substituted aryloxy group; any two of R^1 to R^{12} may form a ring; however, at least one of R^1 to R^{12} is a diarylamino group represented by $-NAr^1Ar^2$ (each of Ar^1 and Ar^2 represents substituted or non-substituted aromatic hydrocarbon group or substituted or non-substituted aromatic heterocyclic group), and at least one of the R^1 to R^{12} other than the diarylamino group is a group with steric hindrance for suppressing aggregation of molecules,

wherein the group with steric hindrance included in the general formula [1] is a substituted or non-substituted alkyl group <u>having not less than four carbon atoms</u>, a substituted

or non-substituted cycloalkyl group, a substituted or non-substituted alkoxy group, a substituted or non-substituted aromatic heterocyclic group, a substituted or non-substituted aralkyl group or a substituted or non-substituted aryloxy group.

2. (Twice Amended) The organic EL device as defined in claim 1, wherein at least one of [A^1] $\underline{Ar^1}$ and Ar^2 has a substituted or non-substituted styryl group as a substituent.

7. (Twice Amended) An organic EL device comprising an anode, a cathode, and one or more organic thin-film layers including a light-emitting layer sandwiched between the anode and the cathode, at least one of the organic thin-film layers including[, either singly or as a mixture,] a benzoperylene compound represented by a general formula [2] as follows:



wherein each of R^{13} to R^{26} independently represents a hydrogen atom, a halogen atom, hydroxyl group, substituted or non-substituted amino group, nitro group, cyano group, substituted or non-substituted [aklyl] alkyl group having not less than four carbon atoms, substituted or non-substituted alkenyl group, substituted or non-substituted styryl group, substituted or non-substituted cycloalkyl group, substituted or non-substituted alkoxy group, substituted or non-substituted aromatic hydrocarbon group, substituted or non-substituted aromatic heterocyclic group, substituted or non-substituted aralkyl group or substituted or non-substituted aryloxy

group; and two of R^{13} to R^{26} may form a ring; and at least one of R^{13} to R^{26} is a group with steric hindrance for suppressing aggregation of molecules,

wherein the group with steric hindrance included in the general formula [2] is a substituted or non-substituted alkyl group, a substituted or non-substituted cycloalkyl group, a substituted or non-substituted alkoxy group, a substituted or non-substituted aromatic heterocyclic group, a substituted or non-substituted aralkyl group, or a substituted or non-substituted aryloxy group.

8. (Amended) The organic EL device as defined in claim 7, wherein at least one of R^{13} to R^{26} is a diarylamino group represented by $-NAr^1Ar^2$ (each of Ar^1 and Ar^2 represents non-substituted aromatic hydrocarbon group or substituted aromatic heterocyclic group)[, and the group with steric hindrance is other than the diarylamino group].

14. (Additional) The organic EL device as defined in claim 1, wherein the group with steric hindrance is adamantyloxy, adamantyl, t-butyl or t-butoxy.

15. (Additional) The organic EL device as defined in claim 1, wherein the steric hindrance group is adamantyloxy or t-butoxy.

16. (Additional) The organic EL device as defined in claim 1, wherein at least two of R^{13} to R^{26} are adamantyloxy or t-butoxy.

17. (Additional) The organic EL device as defined in claim 7, wherein the group with steric hindrance is adamantyloxy, adamantyl, t-butyl, t-butoxy or phenyloxy.

18. (Additional) The organic EL device as defined in claim 7, wherein the group with steric hindrance is adamantyl.

S:\CLIENT\201558\0014\C0217192.1

REGISTRATION NUMBERS

Charles A. Laff	Reg. No. 19,787
Larry L. Saret	Reg. No. 27,674
Martin L. Stern	Reg. No. 28,911
Louis Altman	Reg. No. 19,373
Barry W. Sufrin	Reg. No. 27,398
Marshall W. Sutker	Reg. No. 19,995
Kevin C. Trock	Reg. No. 37,745
Lisa C. Childs	Reg. No. 39,937
Catherine J. Wright-Mitchell	Reg. No. 47,187
David R. Price	Reg. No. 31,557
John C. Bigler	Reg. No. 29,513
Glenn M. Massina	Reg. No. 40,081
Leon Nigohosian, Jr.	Reg. No. 39,791
Donald W. Walk	Reg. No. 29,118
Christopher B. Austin	Reg. No. 41,592
David L. De Bruin	Reg. No. 35,489
Gerald L. Fellows	Reg. No. 36,133
Joseph A. Gemignani	Reg. No. 19,482
Gregory J. Hartwig	Reg. No. 46,761
Daniel S. Jones	Reg. No. 42,697
Richard L. Kaiser	Reg. No. 46,158
Timothy M. Kelley	Reg. No. 34,201
Perry J. Hoffman	Reg. No. 37,150
Casimir F. Laska	Reg. No. 30,862
Edward R. Lawson Jr.	Reg. No. 41,931
Craig J. Loest	Reg. No. 48,557
Richard H. Marschall	Reg. No. 39,290
Thomas A. Miller	Reg. No. 36,871
Kevin P. Moran	Reg. No. 37,193
Thomas J. Otterlee	Reg. No. 48,652
Thomas S. Reynolds II	Reg. No. 45,262
Raye L. Shaffer	Reg. No. 47,933
Chad W. Shea	Reg. No. 48,470
David B. Smith	Reg. No. 27,595
Derek C. Stettner	Reg. No. 37,945
Billie Jean Strandt	Reg. No. 36,940
Glen A. Weitzer	Reg. No. 48,337
Sheldon L. Wolfe	Reg. No. 43,996
Paul F. Donovan	Reg. No. 39,962
Jill A. Fahrlander	Reg. No. 42,518
Grady J. Frenchick	Reg. No. 29,018
Jeffrey D. Peterson	Reg. No. 49,038
Sara Vinarov	Reg. No. 48,524
Teresa J. Welch	Reg. No. 33,049
Robert A. Yesukevich	Reg. No. 36,064